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FIGURE

TABLE

6. WAG 6 FACILITY ASSESSMENT ANALYSIS

The WAG 6 facility assessment helps determine if structures in proximity with WAG 6 CERCLA sites will increase the WAG 6 cumulative risk. No WAG 10 facilities remain.

The WAG 6 and 10 facilities screening process performed in the OU 10-04 RI/FS Work Plan (DOE-ID 1999) included operational facilities, facilities no longer being used for their original mission, and abandoned or demolished facilities. Most of the facilities have been demolished. The screening process determined if a non-FFA/CO identified release has or could occur from these facilities. Facilities eliminated in this screening process will not be further evaluated in this RI/FS, and retained facilities will be further evaluated in this RI/FS. All the sites may be subject to performance standards that take effect under the OU 10-04 ROD. If the Agencies determine they are necessary, contaminant-specific performance standards, probably risk-based, will be developed by the Agencies for the facility assessment sites. The performance standards ensure the sites will not pose an unacceptable cumulative risk following closure.

The facilities that were retained in the screening process are the EBR-601 Reactor Building and Annex, the EBR-602 Security Control House, and the two ANP jet engines displayed outside the EBR-I perimeter fence (Figure 6-1). The WAG 6 facility assessment sites are unique at the INEEL because they are part of a Registered National Historic Landmark to which the public has access.

Part of the facilities assessment included a qualitative review of the risks at each of the WAG 6 sites and a review of management control procedures (MCPs) to verify their adequacy in preventing or controlling releases. Applicable MCPs include safety analysis reports, RCRA contingency plans, spill avoidance and response plans, emergency plan implementing procedures, engineering design files (EDFs), and nuclear materials inspection and storage procedures. Supporting these MCPs are a series of standard operating procedures (SOPs), which were also reviewed.

6.1 Operational Background

6.1.1 Experimental Breeder Reactor-I

The EBR-I was the first reactor built on the National Reactor Testing Station, now called the INEEL. EBR-I's primary mission was to develop and test the concept of a nuclear breeder reactor. However, EBR-I ushered in a new era in nuclear history when it became the first reactor to generate useable amounts of electricity from nuclear energy. After accomplishing this feat on December 20, 1951, by lighting four light bulbs, EBR-I's output was boosted to 100 kW(e) the next day. From that point until its decommissioning in 1964, EBR-I was able to generate all of the electricity for its building, which it often did (http://www.anlw.anl.gov/anlw_history/reactors/ebr_i.html).

On June 4, 1953, the AEC announced that EBR-I had become the first reactor to successfully breed plutonium from uranium. This was another breakthrough, because uranium-238, the most common form of uranium, cannot be used in the fission process. However, plutonium-239, which is produced by the breeding process, can be fissioned. By breeding plutonium in this way, more atoms of fuel are created by the reactor than are used. This process makes it possible to use almost all of the uranium found in nature (http://www.anlw.anl.gov/anlw_history/reactors/ebr_i.html).

EBR-I also set another first on November 27, 1962, when it became the first reactor to produce electricity from a plutonium core. Experiments conducted over the next year provided valuable data on breeding in a plutonium fueled reactor and helped scientists in their understanding of plutonium behavior in an operating reactor (http://www.anlw.anl.gov/anlw_history/reactors/ebr_i.html).

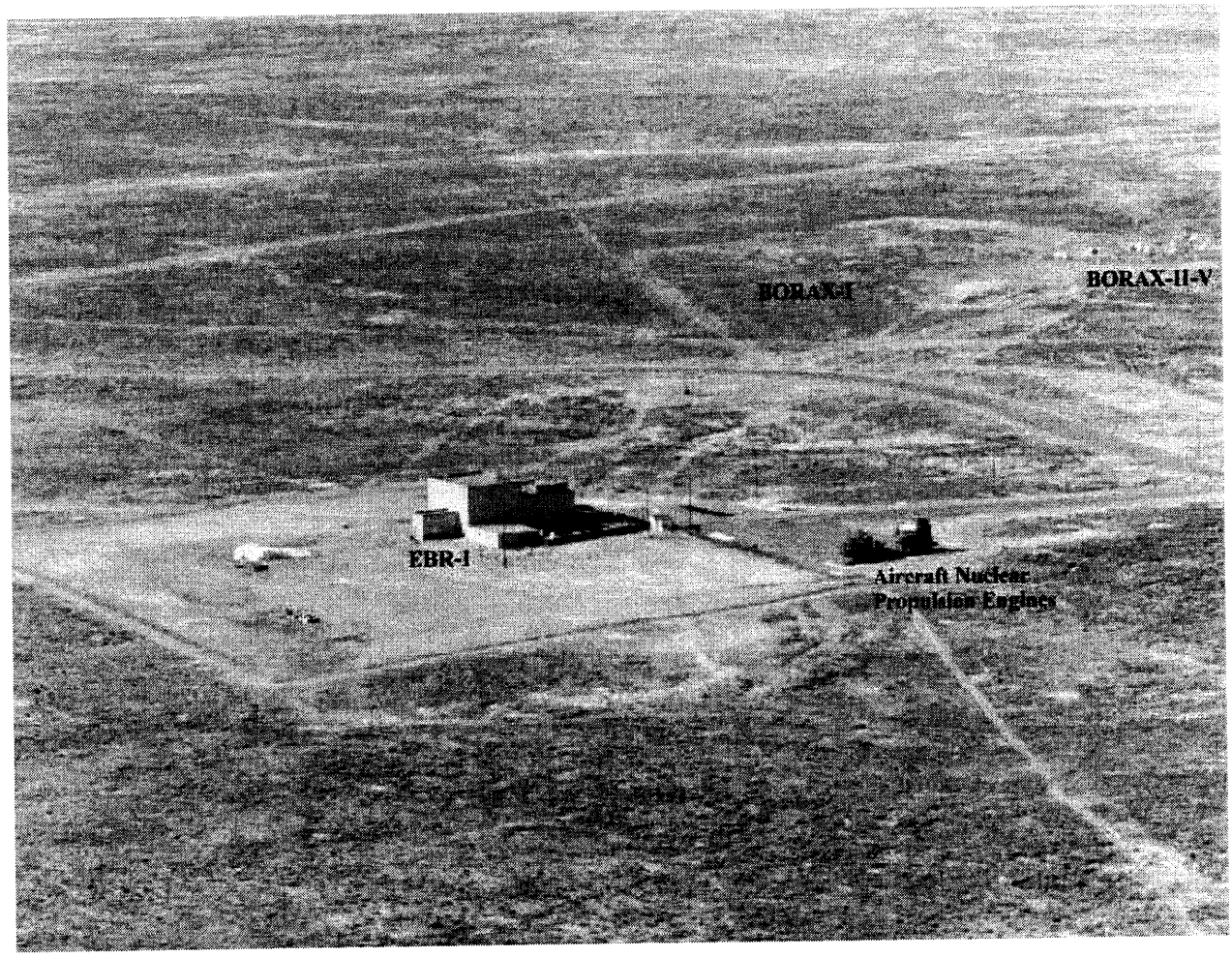

Figure 6-1. Aerial view of the EBR-I and BORAX area in 1996.

On August 26, 1966, President Lyndon B. Johnson designated EBR-I as a Registered National Historic Landmark. In 1973, a plan was agreed on to open EBR-I to the public. After thorough cleaning, decontamination, removal of materials, and other safeguarding activities for public access areas, the public was allowed to tour the facility. The decontamination was finished by the end of May in 1975, and the EBR-I opened to the public for the first time on June 14 of that same year. Free guided tours are available between Memorial Day and Labor Day and by special arrangement the rest of the year. (http://www.anlw.anl.gov/anlw_history/reactors/ebr_i.html). The Landmark designation recognizes the historic importance of EBR-I and requires DOE-ID to minimize harm to the facility as long as feasible.

6.1.2 HTRE-2 and HTRE-3 Assemblies

The two ANP engines, also called HTRE assemblies, on display at EBR-I were built and tested at TAN. The engines, specifically the HTRE-2 and HTRE-3 assemblies, were operated by the U.S. Air Force as part of the ANP program. This program began in 1951 to test the feasibility of using a nuclear reactor to propel an aircraft for a long time. The ANP program was cancelled in 1961 by John F. Kennedy (McCusker 1989).

After the ANP's cancellation, the HTRE assemblies were drained of most liquids such as mercury, and were stored on the rail system at TAN for 17 years. The test assemblies were assigned to the D&D program in 1978 for disposal. In 1986, however, retention was chosen over disposal. The D&D work was completed in the late 1980s, and the test assemblies were relocated to a display pad at EBR-I in December 1988. Fences were erected to prevent direct access to the assemblies, which were first available for viewing on May 22, 1989 (McCusker 1989). The HTRE engines are eligible for listing on the National Register of Historic Places.

6.1.3 EBR-602 Security Control House

The EBR-602 Security Control House, a one-story, wood frame structure was an entryway used to control access to the EBR-I area. The building was closed to the public in 1995 and is deteriorating due to lack of regular maintenance. Through its association with the EBR-I National Landmark, the security control house is also eligible for listing on the National Register.

Additional details of buildings and structures in WAG 6 are included in Table 6-1.

6.2 WAG 6 Facilities Assessment

6.2.1 Risk Issues for EBR-I

Although all nuclear elements were removed from EBR-I during D&D, some areas of the building remain radioactive. These activated and contaminated areas include the reactor core area, the fuel ROD farm, fuel handling storage, and washdown areas, and the conveyor area below the reactor. None of these areas are accessible to the public, and both distance and shielding prevent the public from receiving a radiation dose from these areas at EBR-I. In addition, the EBR-I facility is routinely monitored by radiological control technicians to ensure that the dose in public access areas remains at background levels. If conditions cause the EBR-I building to require D&D, the procedures that exist at the time will be used to control and prevent the spread of contamination to the environment.

Table 6-1. List of WAG 6 facilities in the facility assessment.

Building or Structure No.	OU	Site No.	Description	Comments
EBR-601/-601A	NA	EBR I	EBR I Reactor Building and Annex built in 1953. Visitor Center and offices for Registered National Historic Landmark. Three-story, 2202 m^2 (23,700 ft^2), high-density concrete and brick structure in good condition. Occupied summer months only. Utilities: power, water, sanitary, sewer, phone.	No change to CERCLA risk expected.
EBR-602	NA	EBR I	EBR I Security Control House. A one-story, 23.6 m^2 (254 ft^2), wooden frame structure built in 1953. Serves as entryway for EBR I; occupied intermittently. Utility: power only.	No change to CERCLA risk expected.
HTRE-2 and HTRE-3	NA	EBR I	Aircraft nuclear propulsion jet engines outside EBR I perimeter fence as part of National Historic Landmark. A new site identification form was completed for this site because of potential radionuclide and metal contamination.	No change to CERCLA risk expected.

6.2.2 Risk Issues for the HTRE Assemblies

The HTRE assemblies underwent decontamination at TAN, but some parts of the engines remain radioactive. Before decontamination was initiated, radiation measurements and calculations indicated that the region inside each core shield had radiation levels too high to allow disassembly. So, instead of being disassembled, the internal system openings were sealed. Postdecontamination dose rates at contact with the outside surface of the assemblies ranged from <0.1 mr/hr to 175 mr/hr. Internal contamination is greater than 50,000 cpm (McCusker 1989).

Later, on the display pad at EBR-I, when rain and snow were discovered to be washing through the HTRE-2 assembly, the site Facilities and Maintenance Department sealed the assembly's top with a foam sealant. It is unknown how much and what level of contamination, if any, was released to the environment. In 1998, a new site identification form (Barna and Haney 1998) was submitted to DOE-ID for their consideration in including the soil surrounding the HTRE assemblies as a new CERCLA site under WAG 6. The DOE-ID determined that the potential releases from the assemblies do not meet the requirements for an inactive waste site and should not be included in the FFA/CO action plan. The basis for the determination was that the assemblies are surveyed annually by Radiation Control. The assemblies are under the control of the CFA Facilities and Maintenance Department and, as such, were considered "active" and not "inactive" as required for inclusion in the FFA/CO.

Routine radiation surveys of the engines are completed by radiologic control technicians to measure the direct radiation dose and the contamination levels on and around both engines. The results of these surveys show that direct radiation is present and that removable contamination is present on the HTRE surface. The direct radiation dose at the public fence ranges from approximately background (~0.1 mr/hr) up to approximately 0.5 mr/hr in some locations. Removable contamination reaches approximately 3,000 dpm in specific locations.

A "shield augmentation system" on the HTRE-3 assembly gave additional gamma shielding after reactor shutdown by replacing the water in the primary shield tank with mercury. During augmentation, the primary shield contained approximately 24,000 kg (53,000 lb) of mercury, which made contact maintenance possible in a lower exposure rate. Following completion of the testing program the shield systems were drained, but small volumes of mercury remained in the shield and associated piping. The HTRE-3 was flushed with an acid solution during D&D, but is likely to contain a small volume of mercury. The HTRE-3 was a RCRA-regulated unit. Per the INEEL Part A permit, the HTRE-3 unit was a container. It was clean closed per the State of Idaho approved Hazardous Waste Management Act (HWMA) closure plan. No long term monitoring of the hazardous constituents is required. Clean closure was based on:

- The previous decontamination that the unit received.
- It was an empty container, emptied according to the regulations, and thus, nonregulated.
- Based on the calculations for residuals remaining, there was acceptable risk with the hazardous constituents.

A recent engineering design file, signed in June 2000, covers the radiological evaluation of liquid effluent accumulating in the HTRE assemblies due to precipitation and condensation. The accumulated liquid is periodically drained into drums during routine maintenance, and has been analyzed for radionuclide content. The effluent contains statistically positive amounts of alpha, beta, and gamma emitters.

6.2.3 Risk Issues for the EBR-602 Security Control House

There are no known risk issues associated with the EBR-602 Security Control House.

6.2.4 Risk Issues for Native Americans

The INEEL is within the aboriginal territories of the Shoshone-Bannock Tribes. A wide variety of natural and cultural resources and areas that directly reflect tribal cultural heritage and native landscape ecology are preserved there. These resources are important in maintaining tribal spiritual and cultural values and activities, oral tradition and history, mental and economic well being, and overall quality of life. The sagebrush rangelands that surround the EBR-I facility complex contain a number of sensitive archaeological sites that are of ancestral and traditional importance.

On March 7, 2000, 18 Shoshone-Bannock Tribal Elders and Tribal Risk Assessment Committee members toured the EBR-I area, visiting the National Historic Landmark reactor building, the HTRE engines, and observing the locations of various tanks and pits from a distance. The analysis resulting from this visit along with other visits and exchanges of information (Appendix A) contains no specific detail about impacts to tribal resources or values at the EBR-I facility. Instead, it offers a variety of general concerns centered on the protection and maintenance of land, air, water, plants, animals, and Indian people. Long-term maintenance of the facility along with monitoring and periodic reassessment of the limited contamination present there and in the associated release sites nearby should help to address these general concerns.

6.3 Summary of Facilities Assessment Analysis

The risk issues for the EBR-I site and HTRE assemblies are addressed by current management controls and are concluded to have no effect on the current or future risk calculated for the WAG 6 CERCLA sites. As mentioned, in the future the facility assessment sites will undergo D&D. As always, the general objective of D&D is to take all reasonable measures to minimize worker exposure to radiological, chemical, and industrial hazards and prevent the release of contaminants to the environment. It is possible that D&D will discover a past release, but all of the CERCLA sites at EBR-I are relatively remote from the risk issues identified for the facility assessment sites. It is unlikely any D&D discovery would affect the risk calculations for the CERCLA sites. However, the facility assessment sites may be subject to performance standards that take affect under the OU 10-04 ROD, which would help ensure the sites will not pose an unacceptable cumulative risk following closure.

6.4 References

Argonne National Laboratory–West (ANL-W), *ANL-W History/Reactors,* http://www.anlw.anl.gov/anlw_history/reactors/ebr_i.html, Date effective: September 20, 2000.

Barna, S. M. and T. J. Haney, January 1998, New Site Identification Form-HTRE-2 and HTRE-3 Test Assembly Soil Contamination-Should Not Be Included in FFA/CO Action Plan, Idaho National Engineering and Environmental Laboratory, Revision 00, Document: 14304.

DOE-ID, April 1999, *Work Plan for Waste Area Groups 6 and 10 Operable Unit 10-04 Comprehensive Remedial Investigation/Feasibility Study*, DOE-ID-10554, Revision 0.

McCusker, T. K., September 1989, *Final Report: Decontamination and Decommissioning of Heat Transfer Reactor Experiment Test Assemblies HTRE-2 and HTRE-3,* Idaho National Engineering Laboratory, EGG-2575.